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1: Plant Mol Biol. 1993 May;22(2):293-300.

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## Isolation of a delta 6-desaturase gene from the cyanobacterium Synechocystis sp. strain PCC 6803 by gain-of-function expression in Anabaena sp. strain PCC 7120.

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The enzyme delta 6-desaturase is responsible for the conversion of linoleic acid (18:2) to gamma-linolenic acid (18:3 gamma). A cyanobacterial gene encoding delta 6-desaturase was cloned by expression of a Synechocystis genomic cosmid library in Anabaena, a cyanobacterium lacking delta 6-desaturase. Expression of the Synechocystis delta 6-desaturase gene in Anabaena resulted in the accumulation of gamma-linolenic acid (GLA) and octadecatetraenoic acid (18:4). The predicted 359 amino acid sequence of the Synechocystis delta 6-desaturase shares limited, but significant, sequence similarity with two other reported desaturases. Analysis of three overlapping cosmids revealed a delta 12-desaturase gene linked to the delta 6-desaturase gene. Expression of Synechocystis delta 6 and delta 12-desaturases in Synechococcus, a cyanobacterium deficient in both desaturases, resulted in the production of linoleic acid and gamma-linolenic acid.

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